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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/986,919	11/13/2001	Jeawoan Lee	1567.1021	6274
49455	7590	12/01/2005	EXAMINER	
STEIN, MCEWEN & BUI, LLP 1400 EYE STREET, NW SUITE 300 WASHINGTON, DC 20005			TSANG FOSTER, SUSY N	
			ART UNIT	PAPER NUMBER
			1745	

DATE MAILED: 12/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Interview Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/986,919	LEE ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Susy N. Tsang-Foster	1745	

All participants (applicant, applicant's representative, PTO personnel):

(1) Susy N. Tsang-Foster. (3)\_\_\_\_\_.

(2) Howard Levy. (4)\_\_\_\_\_.

Date of Interview: 22 November 2005.

Type: a) ☒ Telephonic b) ☐ Video Conference  
c) ☐ Personal [copy given to: 1) ☐ applicant 2) ☐ applicant's representative]

Exhibit shown or demonstration conducted: d) ☒ Yes e) ☐ No.

If Yes, brief description: Proposed Amendment faxed on 11/22/2005.

Claim(s) discussed: 1, 5, and 6.

Identification of prior art discussed: All of record in Office Action mailed on 8/25/2005.

Agreement with respect to the claims f) ☐ was reached. g) ☒ was not reached. h) ☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: See Continuation Sheet.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN A NON-EXTENDABLE PERIOD OF THE LONGER OF ONE MONTH OR THIRTY DAYS FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.

\_\_\_\_\_  
Examiner's signature, if required

## Summary of Record of Interview Requirements

### Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record

A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

#### Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews

##### Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

#### 37 CFR §1.2 Business to be transacted in writing.

All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:

- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:

- 1) A brief description of the nature of any exhibit shown or any demonstration conducted,
- 2) an identification of the claims discussed,
- 3) an identification of the specific prior art discussed,
- 4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
- 5) a brief identification of the general thrust of the principal arguments presented to the examiner,  
(The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
- 6) a general indication of any other pertinent matters discussed, and
- 7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

#### Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

Continuation of Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: Applicant proposed amending claim 1 by incorporating the limitations of claims 5 and 6. Applicant argued that there was no motivation to combine Peled with Chu and that the motivation does not appear in the Peled reference. In response, the Examiner stated that the art rejections of record are maintained for the pending claims because there is motivation provided in the previous Office Action combining Peled with Chu and that one of ordinary skill in the art would appreciate that a more porous current collector would provide for a more porous cathode that would allow extensive electrolyte solvent communication throughout the bulk of the cathode and improved ionic conductivity in the electrode would lead to improved battery performance. The Examiner stated that motivation may be found in the knowledge generally available to one of ordinary skill in the art as stated in MPEP 2142. The Examiner stated that an evidentiary reference will be provided to show this motivation. The Examiner also stated in the response to arguments section in the Office Action dated 8/25/2005 that it is also well known in the art that increased loading of the cathode active material would be achieved when the current collector is highly porous which would also increase cathode real surface area which in turn would greatly improve cell current density. As evidenced by Chottiner (US Patent No. 4,152,489), a 75% to 95% porous metal current collector can have between 45% to about 90% of its pore volume be filled with active material (see abstract) with increased battery power output. The Examiner also stated that adjusting the porosity of a current collector does not appear to be novel in the battery art and that there are numerous references in the alkaline battery art with porous current collectors with high porosity to achieve high loading of active material.

Any inquiry concerning this communication or earlier communications should be directed to examiner Susy Tsang-Foster whose telephone number is (571) 272-1293. The examiner can normally be reached on Monday through Friday from 9:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

su/



**SUSY TSANG-FOSTER  
PRIMARY EXAMINER**

**\*\*\* PROPOSED AMENDMENT \*\*\***

Nov-22-05 12:13pm From-STEIN, McEWEN & BUI LLP

202-216-9510

T-440 P.001/008 F-496

**LAW OFFICES  
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**FACSIMILE TRANSMISSION**

November 22, 2005

TO: Susy Tsang Foster

ATTN:

FAX NO.: <sup>(271)</sup> 273-1293

TELEPHONE:

FROM: Howard I. Levy

RE: 09/956, 919

NO. OF PAGES (Including this Cover Sheet)

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**COMMENTS:**

Client Inst: incorporate claims 5 and 6 into claim 1.  
Pls comment on whether claim 1 would be allowable  
w/ or w/out <sup>client's</sup> claim amendments

**\*\*\* PROPOSED AMENDMENT \*\*\***

Nov-22-05

12:13pm

From-STEIN, McEWEN & BUI LLP

202-216-9510

T-440

P.002/008

F-496

Docket No.: 1567.1021

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re the Application of:

Jaewoan LEE, et al.

Serial No. 09/986,919

Group Art Unit: 1745

Confirmation No. 6274

Filed: November 13, 2001

Examiner: Susy N. Tsang Foster

For: **POSITIVE ELECTRODE FOR A LITHIUM-SULFUR BATTERY AND A LITHIUM-SULFUR BATTERY INCLUDING THE POSITIVE ELECTRODE**

**PROPOSED AMENDMENT**

Commissioner for Patents  
PO Box 1450  
Alexandria, VA 22313-1450

Sir:

This is in response to the Office Action mailed August 25, 2005, and having a period for response set to expire on November 25, 2005.

The following amendments and remarks are respectfully submitted. Reconsideration of the claims is respectfully requested.

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**IN THE CLAIMS:**

Please CANCEL claims 13-43 without prejudice or disclaimer and AMEND claims 3 and 4 in accordance with the following:

1. (PREVIOUSLY PRESENTED) A positive electrode for a lithium-sulfur battery comprising:
  - a current collector having pores comprising at or greater than 60% porosity and less than 90% porosity based on an overall volume of said current collector; and
  - a positive active mass comprising a sulfur-based active material, a conductive agent, and a binder disposed in the pores of said current collector,wherein the current collector comprises one of a metal foam having the pores and a non-woven fabric coated with a metal to provide the pores.
2. (PREVIOUSLY PRESENTED) The positive electrode of claim 1, wherein the sulfur-based active material is at least one selected from the group consisting of elemental sulfur, solid  $\text{Li}_2\text{S}_n$  ( $n \geq 1$ ), a catholyte in which  $\text{Li}_2\text{S}_n$  ( $n \geq 1$ ) is dissolved, an organosulfur compound, and a carbon-sulfur polymer.
3. (CURRENTLY AMENDED) The positive electrode of claim 1, wherein the pores of said current collector comprise at least 80% and up to, but less than, 90% porosity of an overall volume of said current collector.
4. (CURRENTLY AMENDED) The positive electrode of claim 1, wherein the pores of said current collector comprise at least 80 and up to, but less than, 90% porosity of an overall volume of said current collector.
5. (PREVIOUSLY PRESENTED) The positive electrode of claim 1, wherein said porous current collector comprises the metal foam comprising a resin foam coated with a metal, where the coated resin foam is subjected to a pyrolysis process.
6. (PREVIOUSLY PRESENTED) The positive electrode of claim 5, wherein said porous current collector further comprises a conductive agent other than the metal.

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7. (PREVIOUSLY PRESENTED) The positive electrode of claim 1, wherein said porous current collector comprises the non-woven fabric coated with a metal.

8. (ORIGINAL) The positive electrode of claim 1, wherein said porous current collector comprises a carbon fiber.

9. (ORIGINAL) The positive electrode of claim 5, wherein the metal is coated using a coating method that comprises one of electroplating and electroless plating.

10. (ORIGINAL) The positive electrode of claim 7, wherein the metal is coated using a coating method that comprises one of electroplating and electroless plating.

11. (ORIGINAL) The positive electrode of claim 5, wherein the metal is at least one selected from the group consisting of nickel, aluminum, and mixtures thereof.

12. (ORIGINAL) The positive electrode of claim 7, wherein the metal is at least one selected from the group consisting of nickel, aluminum, and mixtures thereof.

13-43. (CANCELLED)

44 (PREVIOUSLY PRESENTED) The positive electrode of claim 6, wherein the conductive agent comprises carbon.



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**REMARKS**

In accordance with the foregoing, claims 3 and 4 have been amended and claims 13-43 have been cancelled without prejudice or disclaimer. No new matter has been entered. Therefore, claims 1-12 and 44 are pending and reconsideration is respectfully requested.

**CLAIM OBJECTIONS:**

Claims 3 and 4 are objected to under 37 CFR §1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. However, since claims 3 and 4 have been amended to recite terms in agreement with the language of claim 1. Thus, it is respectfully requested that the objections be withdrawn.

**REJECTIONS UNDER 35 U.S.C. §112:**

Claims 1-12 and 44 are rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement because the recitation of the range, "at or greater than 60% porosity and less than 90% porosity," was not part of the original disclosure. However, as applicant has noted in previous Office Actions, original claims 3 and 4, which are to be understood as being supported by the original disclosure according to section 2163(l)(A) of the MPEP, together define a range of "at or greater than 60%" and "less than 90%," respectively. Thus, it is requested that the Examiner either withdraw this rejection or present some reference or argument as to why the subject matter of original claims 3 and 4 does not support the presently claimed range.

For example, if it is the Examiner's position that either an aspect of the originally claimed invention was not described with sufficient particularity such that one skilled in the art would recognize that the applicant had possession of the claimed invention, then applicants respectfully request that the Examiner make clear what aspect of the originally claimed invention was not described with sufficient particularity. Similarly, if it is the Examiner's position that the original claims 3 and 4 require an essential or critical feature which was not adequately described in the specification and which was not conventional in the art or known to one of ordinary skill in the art, then applicants respectfully request that the Examiner explain what critical feature was not adequately described. Failing that, applicants submit that the rejection should be withdrawn.

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As a pre-emptive matter, if it is the Examiner's position that the ranges disclosed by the claims 3 and 4 are not adequately described in the specification as originally filed because paragraph [0015] of the original specification does not mention these specific ranges, applicants note that it would not require any degree of expertise to substitute the specified claim ranges with the claimed ranges of claims 3 and 4. As such, any dissimilarity between the specification and the claims does not rise to the level of the examples provided by the section 2163(I)(A). Therefore, such dissimilarities do not justify a "written description" rejection.

**REJECTIONS UNDER 35 U.S.C. §103:**

Claims 1-5 and 9-12 are rejected under 35 U.S.C. §103(a) as being unpatentable over Chu et al. (U.S. Patent 6,030,720) in view of Peled et al. (U.S. Patent 4,410,609), and claims 6-8 and 44 are rejected under 35 U.S.C. §103(a) as being unpatentable over Chu et al. (U.S. Patent 5,686,201) in view of Peled et al. (U.S. Patent 4,410,609) as applied to claims 1 and 5 above, and further in view of Kawakami (U.S. Patent 6,475,664).

Regarding the rejections of claims 1-5 and 9-12, applicants note that the Examiner suggests that since Chu does not disclose that the disclosed current collector comprises at least 60% porosity and less than 90% porosity based on an overall volume of the current collector, it would have been obvious to combine the Peled teaching of a positive current collector having 80% or 75-90% porosity with the teachings of Chu. In support of this position, the Examiner states that having the porosity of the current collector in Chu to be 80% porous "would provide a cathode with high porosity so as to allow extensive electrolyte solvent communication throughout the bulk of the cathode and improve ionic conductivity in the electrode and lead to improved battery performance." Applicants disagree with this analysis for at least the following reason.

Noting that the Examiner did not cite any section of either Chu or Peled for the proposition that having the porosity of the current collector in Chu to be 80% porous "would provide a cathode with high porosity so as to allow extensive electrolyte solvent communication throughout the bulk of the cathode and improve ionic conductivity in the electrode and lead to improved battery performance," applicants respectfully submit that this reasoning is indeed not found in either of the references, but rather, was arrived at by the Examiner alone. Such analysis is prohibited under, for example, section 2143.01 of the MPEP which states that "obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves."

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With respect to the suggested combination here, there is no explicit evidence in Chu, nor implicit evidence that can be gleaned from Chu that the suggested combination with Peled would produce the results predicted by the Examiner. In fact, Chu contains no teaching or suggestion that a current collector of a particular porosity would provide any benefits over and above that of any other current collector. Moreover, it follows that Chu does not disclose any indications that modifying the porosity of the current collector as suggested by the Examiner would have negative effects on the performance of the feature. Here, applicants assert that if the Examiner is going to make unsupported statements as to the supposedly positive effects of modifying the porosity of the Chu current collector, perhaps the Examiner should consider whether there would be any unintended consequences of the suggested modification of which there must be a few.

Therefore, applicants respectfully assert that claims 1-5 and 9-12 define over any and all combinations of the references and that the rejections of these claims are, thus, overcome.

Regarding the rejections of claims 6-8 and 44, it is noted that the additional reference to Kawakami does not cure the defects of the references to Chu and Peled and that, therefore, the claims define over any and all combinations of these references. Thus, these rejections are also overcome.

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**CONCLUSION:**

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 503333.

Respectfully submitted,

STEIN, MCEWEN & BUI, LLP

Date: \_\_\_\_\_

By: \_\_\_\_\_  
Howard I. Levy  
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